

WHAT IS CLAIMED IS:

1. A transmission control device including a frictional coupling element and a lockup clutch of a hydraulic transmission device, which are provided on a driving-power transmitting path between an engine and a driving wheel and adaptive respectively to control a slip state between an input element and an output element thereof, comprising:

first control means for controlling a slip state of the frictional coupling element;

second control means for controlling a slip state of the lockup clutch;

driving condition detecting means for detecting a driving condition of a vehicle;

classification means for classifying the vehicle driving condition detected by said driving condition detecting means into a region;

determination means for determining when the vehicle is not at a gear shift timing;

and

association control means for executing a control to associate said first control means with said second control means according to a classification result by said classification means, when it is determined by said determination means that the vehicle is not at the gear shift timing.

2. The transmission control device of claim 1, wherein said association control means control said first control means so as to make the frictional coupling element in a slip state and control said second control means so as to make the lockup clutch in a lockup state, when the vehicle driving condition is classified into a first region by said classification means.

3. The transmission control device of claim 1, wherein said association control means control said first control means so as to make the frictional coupling element in a slip state and control said second control means so as to make the lockup clutch in a slip state, when the vehicle driving condition is classified into a second region by said classification means.

4. The transmission control device of claim 1, wherein said association control

means control said first control means so as to make the frictional coupling element in a slip state and control said second control means so as to make the lockup clutch in a converter state, when the vehicle driving condition is classified into a third region by said classification means.

5. The transmission control device of claim 1, wherein said control of the first control means includes a control to adjust a slip degree of the frictional coupling element at a specified target slip.

6. The transmission control device of claim 1, wherein said control of the first control means includes a control to make the frictional coupling element in a weak coupling state so as to allow it to slip when an instantaneous torque changing occurs.

7. The transmission control device of claim 2, wherein said first region corresponds to a vehicle driving condition where an engine load is lower than a specified engine load in a relatively low-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area, and/or a vehicle deceleration condition where the engine load is extremely low.

8. The transmission control device of claim 3, wherein said second region corresponds to a vehicle driving condition where an engine load is higher than a specified engine load in a relatively low-load area and lower than a specified engine load in a relatively high-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area.

9. The transmission control device of claim 4, wherein said third region corresponds to a vehicle driving condition where an engine load is higher than a specified engine load in a relatively high-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area.

10. The transmission control device of claim 6, wherein a region where said frictional coupling element is made in the weak coupling state corresponds to a vehicle driving condition where an engine load is higher than a specified engine load in a relatively

high-load area and/or a vehicle speed is higher than a specified vehicle speed in a relatively low-speed area.

11. A transmission control device including a frictional coupling element and a lockup clutch of a hydraulic transmission device, which are provided on a driving-power transmitting path between an engine and a driving wheel and adaptive respectively to control a slip state between an input element and an output element thereof, comprising:

- a first control device adaptive to control a slip state of the frictional coupling element;

- a second control device adaptive to control a slip state of the lockup clutch;

- a driving condition detecting sensor adaptive to detect a driving condition of a vehicle; and

- a control unit which receives a detecting signal of said driving condition detecting sensor and generates a control signal to said first and second control devices,

wherein said control unit includes classification section for classifying the vehicle driving condition detected by said driving condition detecting sensor into a region, determination section for determining when the vehicle is not at a gear shift timing, and association control section for executing a control to associate said first control device with said second control device according to a classification result by the classification section when the vehicle is not at the gear shift timing.

12. The transmission control device of claim 11, wherein said first control device is controlled so as to make the frictional coupling element in a slip state and said second control device is controlled so as to make the lockup clutch in a lockup state, when the vehicle driving condition is classified into a first region corresponding to a vehicle driving condition where an engine load is lower than a specified engine load in a relatively low-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area, and/or a vehicle deceleration condition where the engine load is extremely low.

13. The transmission control device of claim 11, wherein said first control device is controlled so as to make the frictional coupling element in a slip state and said second control device is controlled so as to make the lockup clutch in a slip state, when the vehicle driving condition is classified into a second region corresponding to a vehicle driving condition where an engine load is higher than a specified engine load in a relatively low-load area and lower than a specified engine load in a relatively high-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area.

14. The transmission control device of claim 11, wherein said first control device is controlled so as to make the frictional coupling element in a slip state and said second control device is controlled so as to make the lockup clutch in a converter state, when the vehicle driving condition is classified into a third region corresponding to a vehicle driving condition where an engine load is higher than a specified engine load in a relatively high-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area.

15. The transmission control device of claim 11, wherein:

said first control device is controlled so as to make the frictional coupling element in a slip state and said second control device is controlled so as to make the lockup clutch in a lockup state, when the vehicle driving condition is classified into a first region corresponding to a vehicle driving condition where an engine load is lower than a specified engine load in a relatively low-load area and a vehicle speed is lower than a specified vehicle speed in a relatively low-speed area, and/or a vehicle deceleration condition where the engine load is extremely low;

said first control device is controlled so as to make the frictional coupling element in the slip state and said second control device is controlled so as to make the lockup clutch in a slip state, when the vehicle driving condition is classified into a second region corresponding to a vehicle driving condition where the engine load is higher than said specified engine load in the relatively low-load area and lower than a specified engine load

in a relatively high-load area and the vehicle speed is lower than said specified vehicle speed in the relatively low-speed area; and

said first control device is controlled so as to make the frictional coupling element in the slip state and said second control device is controlled so as to make the lockup clutch in a converter state, when the vehicle driving condition is classified into a third region corresponding to a vehicle driving condition where the engine load is higher than said specified engine load in the relatively high-load area and the vehicle speed is lower than said specified vehicle speed in the relatively low-speed area.